

EXCAVATION OF A PIT AT SITE N38/25, STATION BAY, MOTUTAPU ISLAND

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Abstract. Site N38/25B is a group of pits on a ridge at Station Bay, Motutapu Island. It is separated by a defensive ditch from the main area of N38/25, and is probably associated with a pre-ditch occupation of the rest of the site. Evidence recovered from excavation of the largest pit was consistent with its use for storage, and some continuity of use was shown by small oval pits dug into its floor. Several periods of occupation were indicated by adjacent external structures. Copious plant remains, chiefly in the form of charcoal, included some prepared fibres. Fire-reddened clay may indicate a local "make-do" source of red ochre.

TOPOGRAPHY AND SITE DESCRIPTION

Site N38/25 is situated on the crest of a long narrow ridge which runs down in a southerly direction from a higher and wider ridge. The subsidiary ridge runs out into the sea to form the east side of Station Bay in the north-east coastline of Motutapu Island (Fig. 1; Davidson this volume, Fig. 1). Site N38/25 was originally recorded as a headland pa with adjacent pits (Davidson 1970a, Fig. 1 and p. 5). The profile of the northern part of the site is concave with a massive ditch extending across the lowest point. Just to the north of the ditch are the pits with which this report is concerned. They are designated as site N38/25B.

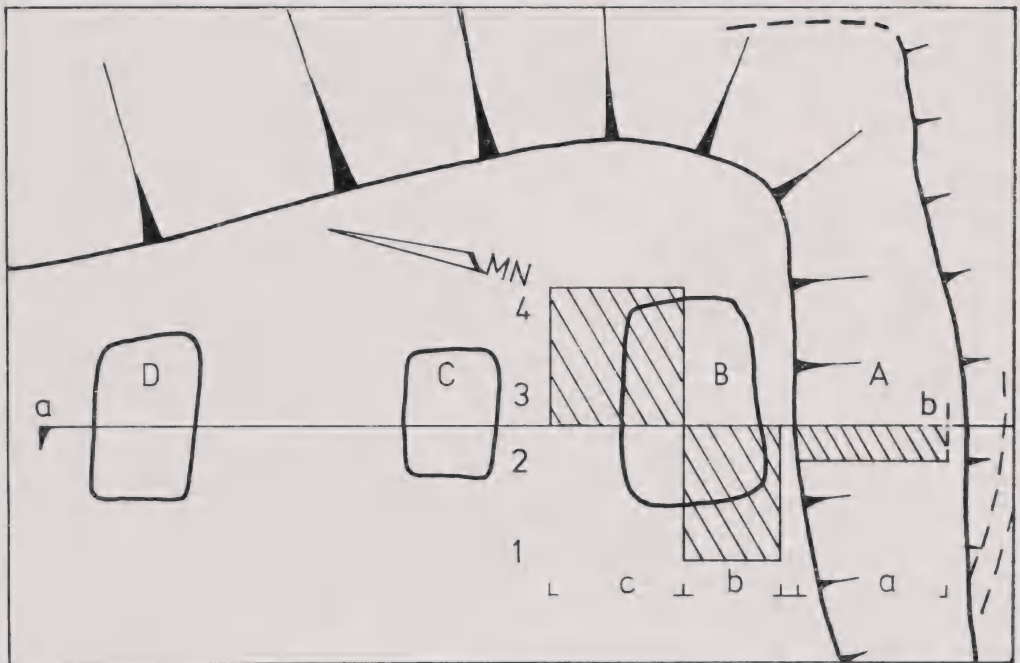


Fig. 1. General view of site N38/25 from the north, with Station Bay on the right. The two small pohutukawa trees in the centre are growing out of the northern ditch, with N38/25B directly in front.

In this area, the ridge top is about 30 m above sea level and between 9 and 12 m wide, with its surface dipping gently to the south-west. On the east of N38/25B there is a steep drop to the sea. This begins with an abrupt grassed descent to a spread of bare rock which is angled back at 60 degrees and difficult to climb. At the base of the cliff there is a narrow shore platform, covered at high tide. On the west side of the ridge facing the bay, below N38/25B, the upper surface merges into the downward slope to the bay beach, at an angle which is quite gradual at first, and everywhere less steep than on the east side. Slopes are grass-covered all the way down to a wider shore platform, and at this point also the side of the ridge begins to swing out to the west around the head of Station Bay.

On the ridge top, three pits were initially visible as surface depressions, roughly in line with each other in the middle of the ridge, with rectangular outlines, and with long axes at right angles to the long axis of the ridge.

The uppermost pit, D, (Fig. 2), is ca. 5 x 3 m and over 0.5 m deep measured from the lowest edge. It is ca. 6 m away from the next pit, C, which is roughly the same depth, but smaller (4 x 3 m). Pit C is ca. 4 m from the excavated pit B, the largest of the group, with an unexcavated outline of ca. 8 x 5 m. All three pits have



 Excavated area

a - b section line


 Datum of N 38/25b

Fig. 2. Plan of site N38/25B, showing excavated area. Scale: section line a-b represents 25 m.

high back or upridge walls, which form a series of stepped scarps down the ridge (Davidson this volume, Fig. 1). This is most marked in pits D and B, where the back walls approach 2 m in height, and less so in pit C, where the drop is *ca.* 1 m. In the lowest pit, B, the front or downslope wall also forms part of a scarp with a drop of 1 m. This scarp extends right across the ridge top at this point, and marks the boundary of a narrow flat area below pit B, called in Figure 2, area A. Area A also runs right across the ridge top on the lip of the northern ditch. In opposition to the general tendency of the upper surface of the ridge which dips south-west, this area dips gently to the east. It is about 5 m wide at its central point, and is cut off by the sharply descending north wall of the northern defensive ditch.

There are several directions of approach to the pit area; firstly from the direction of the pa by paths zig-zagging down and up the sides of the ditch; secondly from the north along the seaward side of the ridge. A third approach runs round the head of Station Bay at shore level, along the pebble beach, and then across the shore platform to the grassed west side of the ridge where a diagonal path leads by a moderately steep climb to the lower end of the pit area. The fourth and easiest approach is from the north again, down the moderate slope from the higher ridge, which itself leads north-west to join the main ridge system of the island.

VEGETATION

The ground surface in the vicinity of N38/25B is, like that of the rest of the island, covered with introduced pasture grasses. However, a few resilient indigenous species, possible relics of pre-European plant communities, maintain a hold. In the immediate vicinity of the site, two youngish pohutukawa trees (*Metrosideros excelsa*, Gaertn.) have established themselves on the weathered north wall of the ditch, and there are others on the sea cliff on the east side of the ridge, and one or two on the slopes to the west. Bushes of the smaller species of *Phormium* (*P. cookianum*, Le Jolis) are similarly distributed, being relatively numerous on small ledges in steep areas of the sea cliffs, but seen only as occasional isolated individuals on the west side of the ridge. No specimens of *Phormium tenax* were seen in the neighbourhood of the site. Further down the ridge there are very steep bare slopes just below the summit area of the pa on the east side, and these support a number of small scrubby patches of bracken, *Pteridium aquilinum* var. *esculentum*. No Cordylines or tree ferns were seen anywhere in the vicinity, the nearest and only observed tree fern being at Home Bay, two and a half miles away.

ASPECT

Motutapu Island shares with the Hauraki Gulf generally a fairly equable climate without any great extremes of winter cold or summer heat. Storms are not particularly frequent, and Station Bay is generally sheltered except in an easterly storm. The ridge sites, however, are in a rather exposed situation, being exposed to the full force of winds from three quarters, and only partly protected against those from the north. During the period of the excavation, (summer, 1970 - 71), days generally began with air on the ridge quite calm, but wind strength mounted, and at evening was usually moderate to strong. Air temperatures were warm, however, and the situation good if shelter from the wind was obtainable.

GEOLOGY

Throughout the northern two-thirds of Motutapu, the geology of which has been the subject of detailed study by W. Mayer (1965), strata are chiefly greywackes and argillites, of Mesozoic, probably Jurassic age, and have been folded, tilted, faulted and jointed. Strata in the immediate vicinity of Station Bay mapped by Mayer (1965, Fig. B), follow the general north-westerly strike of the Mesozoic on Motutapu, which is roughly parallel to the trend of the east headland ridge which contains site N38/25. On the ridge itself there is some displacement of strike further round towards the west. To the north-east of Station Bay, Mayer has mapped an anticline (1965, Fig. C), which closes in a direction slightly west of south, and the line of the east coast of the ridge is a rough approximation of the line of continuation of the fold axis in the direction of plunge. To the west of this line, strata are dipping westward at large angles, being stacked on edge in a position approaching the vertical.

Down the long west side of Station Bay there is a shoreside strip of outcropping cherts and volcanic argillites. East of this, as far as the mouth of the small stream at the east end of the pebble beach at the head of the bay, strata consist of argillites in the basement rocks. To the east of this stream, and continuing roughly to the point where the beach track begins to climb up the ridge side to the pit area of N38/25B, there is a sequence of interbedded greywackes and argillites. These outcrop on the shore platform just west of the ridge, where they show predominantly green, blue and grey colours. These beach outcrops show minor faulting and are closely jointed; and joint, fault and bedding surfaces are heavily mineralised, chiefly with limonite.

On the ridge itself, strata once more consist of argillites, and on the outcrops on the shore platform surrounding the headland, the same pattern of mineralisation of surfaces was observed. On the top and sides of the ridge, the argillite substrate, except on the exposed eastern cliff area, has weathered to light coloured clays, streaked with mosaic patterns of weathered joint materials.

This clay is exposed in pockets of slumping on the western slopes, and in the ditch cut across the ridge top. Elsewhere it is covered by topsoil which is underlain in places by patches of weathered volcanic ash of recent origin.

In the course of excavation, a bedding plane between argillite strata was found to run across pit B, roughly parallel to the east wall and about 1 m west of it. The bed to the east of this plane was marked by a rather uniformly weathered pale yellow clay, while the bed on the west had weathered to a pale greyish white, with rust-coloured weathered joint fillings. This bed appeared to extend across pit B, and in it soft, moderately decomposed rock at 1.3 m below the present ground surface showed a green colour similar to that of many of the beach outcrops. A second bedding plane marking off a third bed, although not seen, evidently ran just beyond the west edge of pit B, as clay at some depth just beyond this was a brown yellow colour.

THE EXCAVATION

Site N38/25B was excavated concurrently with excavations on other areas of N38/25, under the overall direction of Janet Davidson, of the Auckland Institute

and Museum, by members of the University of Auckland Archaeological Society, between December 19, 1970, and January 26, 1971. A grid of quadrates was laid out from a datum point (b on Fig. 2), sited at the south-east corner of a quadrate in area A. Quadrates B1, B2, C3 and C4 were excavated, covering about half the area of pit B and some adjacent ground. These were all 2 m wide; in row B they were 3 m long, and in row C, 4 m. A 50 cm wide baulk was left between B2 and the quadrate in area A. Baulks were not left elsewhere except for a couple of small pillar baulks on the west edge of pit B, straddling the boundary B2 and B1, to record stratigraphy against the pit wall. One of these is seen in Fig. 5 (top right), and both were later removed. Excavation was largely by hand trowel, and proceeded at an average rate of 0.06 m per day in depth. Total depth of deposits removed varied from 0.05 to 1.30 m, with a total volume of about 9 m³. Excavated material was not sieved. Approximately 0.45 m³ of material excavated was retained.

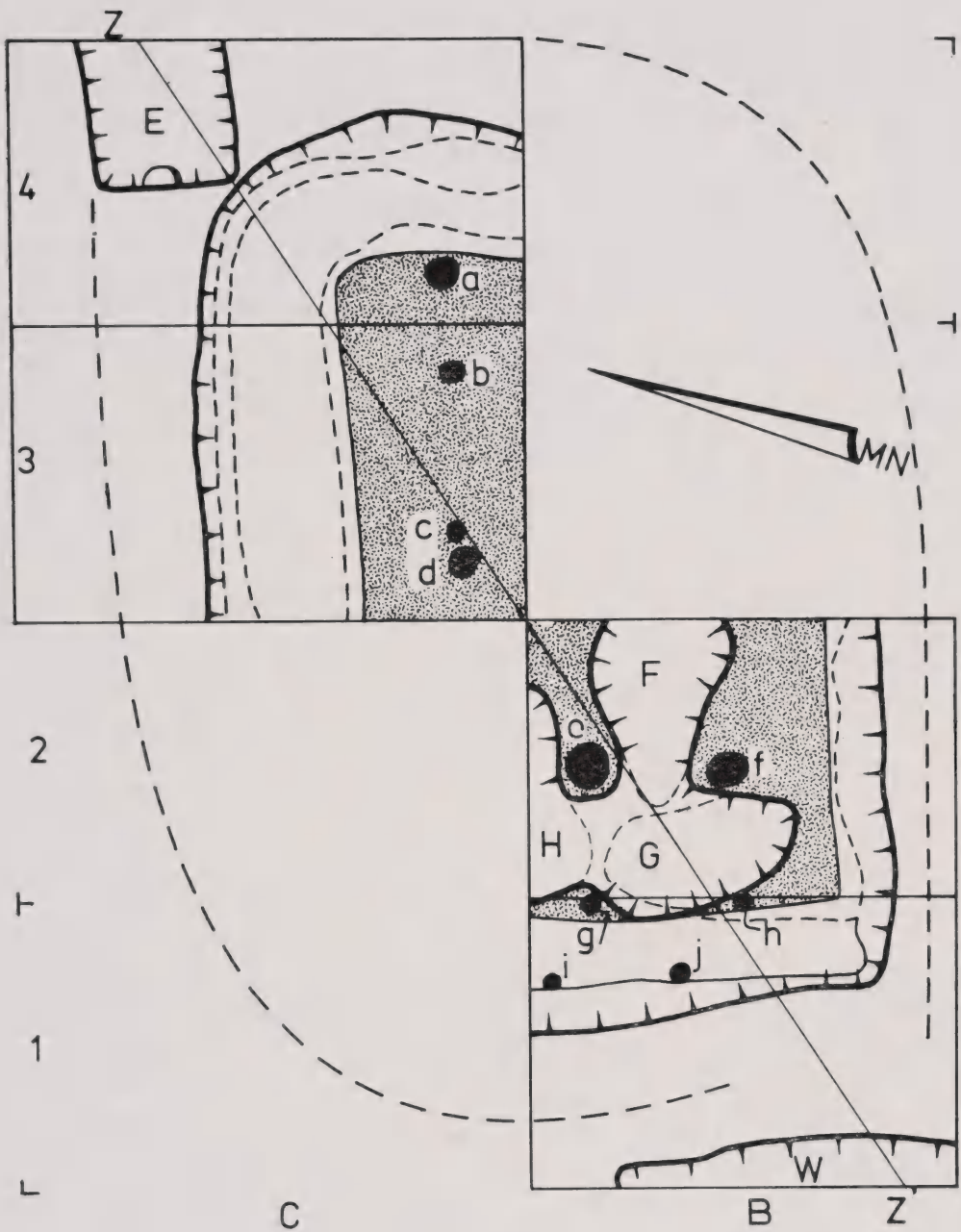
Excavation of four quadrates, B1, B2, C3 and C4, combined with information derived from the excavation of the strip across area A (Davidson, pers. comm.), showed more complexity of occupation than appeared on the surface (Figs. 3 and 5), and indicated several separate periods of use for the area. The most recent structural alteration was apparently to area A, and this itself seems to have preceded the cutting of the ditch on its south side in connection with the defences of the pa.

Pit B was initially dug as a large (5 x 3 m), flat-floored pit (Fig. 3), about 1 m deep, with three median rows of postholes. At least three small pits with shallow rounded bases were later dug into the floor between the roof supports, and then filled in. Two associated structures were also revealed outside the perimeter of pit B. Pit E is a narrow shallow pit, with a small buttress, on the north - east of pit B, which appears just to postdate the period of use of pit B. Structure W on the west of pit B is possibly a terrace, and appears to predate it considerably. All three structures, B, E and W, are in alignment, with sides parallel, suggesting that later structures were placed with some reference to earlier ones.

STRUCTURE W

The earliest activity is represented by structure W, only part of which fell within the excavated area. As partly seen in excavation, W has two approximately straight sides meeting in a right angle (Figs. 3 and 5). One side, 2 m long, is parallel with the west edge of pit B, from which it is separated by a baulk about 2 m thick at the base. The top of this baulk is curved, the top of the curve being just below the present ground surface. The short side of W, only about 30 cm long in the excavated area, runs west, and seems to be quite short, as the ridge top drops away on the edge of the excavated area (Fig. 4).

The walls of W are 60 to 70 cm deep, and are slightly beyond the vertical at the top, where they have been pushed by lateral pressure from the baulk. Structure W faces the south - west and has a floor which slopes gently down in this direction. Floor and walls are cut into a brown-yellow clay, which is deeply cracked into large shrinkage polygons, with cracks penetrating more than 20 cm. In the south - west corner of the floor, there is a deep structural crack in the clay, about 4 cm wide and possibly more than 1 m deep. As the clay of the walls and floor was moist when excavated, and the depth of cover at the base was about 1 m



N 38/25b .

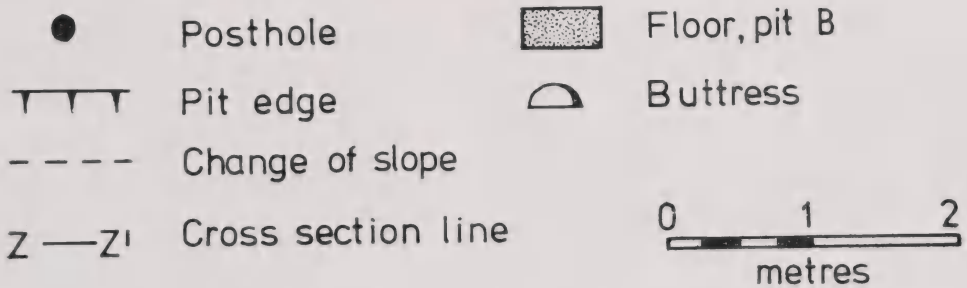


Fig. 3. N38/25B. Structural features of quadrates B1 to C4.

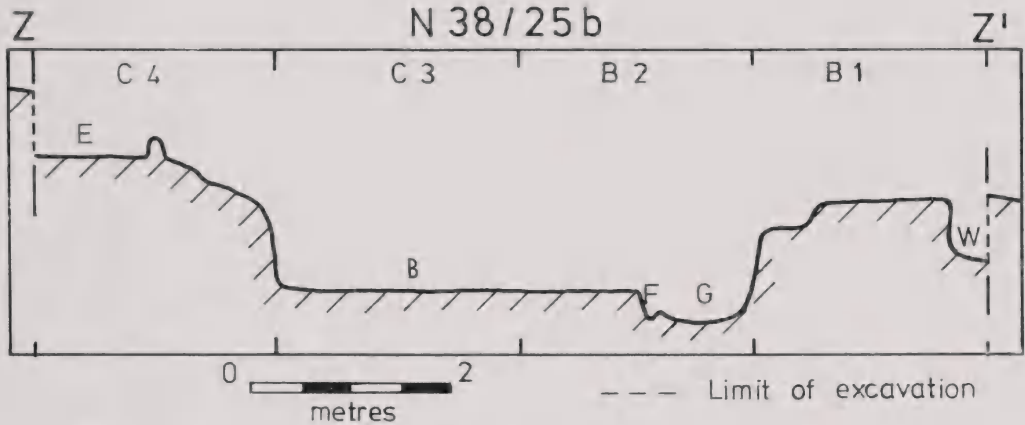


Fig. 4. N38/25B. Cross-section, Z-Z' (see Fig. 3), of quadrates C4 to B1, showing relative heights of excavated structures.

from the ground surface, this cracking cannot be explained as normal present day shrinkage, such as is seen in the clay of the rim areas of pit B (Fig. 5), where the surface clay has been split to a depth of a few centimetres under a thin cover of topsoil. The severe cracking in W appears to record a period when walls and floors were subject to prolonged direct exposure to the sun's heat, inducing deep shrinkage and cracking which its subsequent history failed to remove.

The lower two thirds of deposits in W seem to have formed by natural means, and contain no cultural material. Resting directly on the cracked floor are small patches of rubble, ("rubble" being used here of weathered fragments of argillaceous rock which still keep an angular outline and some stony hardness). Over these is a thick layer of alternating deposits of two types of material, the most frequent being a blackish fine silty material which seems to be weathered Rangitoto ash. Between the black layers are thin lenses of yellow clay-derived material. The black layers seem to have been brought in mainly by the wind, and the yellow lenses possibly by heavy rain from exposed clay areas higher up the ridge.

Structure W is clearly of artificial origin, but just what it is, is less clear. It might perhaps have been a pit, but with the ground sloping away immediately below, there is hardly room for two more walls, though it could be argued that these might have been eroded or artificially removed. Another possibility, and perhaps a more economical one, is that it is a small terrace facing south-west. This aspect, which would ensure maximum exposure to summer sunlight, is consistent with the evidence of prolonged drying in the cracked clay walls.

After it became disused, the probable terrace was gradually covered with windblown and rainwashed material. There is a time gap between the disuse of W and the digging of pit B. Ash deposits were found only in structure W and in a few small thin patches in pit B close to its south-west corner, where they had clearly originated from W. No trace of ash was met with in the stratigraphy of either modified or unmodified areas in quadrates C3 and C4, or in area A. Thus, the only immediate source of ash was W, making it clear that this structure must have been dug, used, and then partly at least covered with ash before pit B was in use. Thin streaks of ash are found in the south-west corner of pit B from the lowest levels

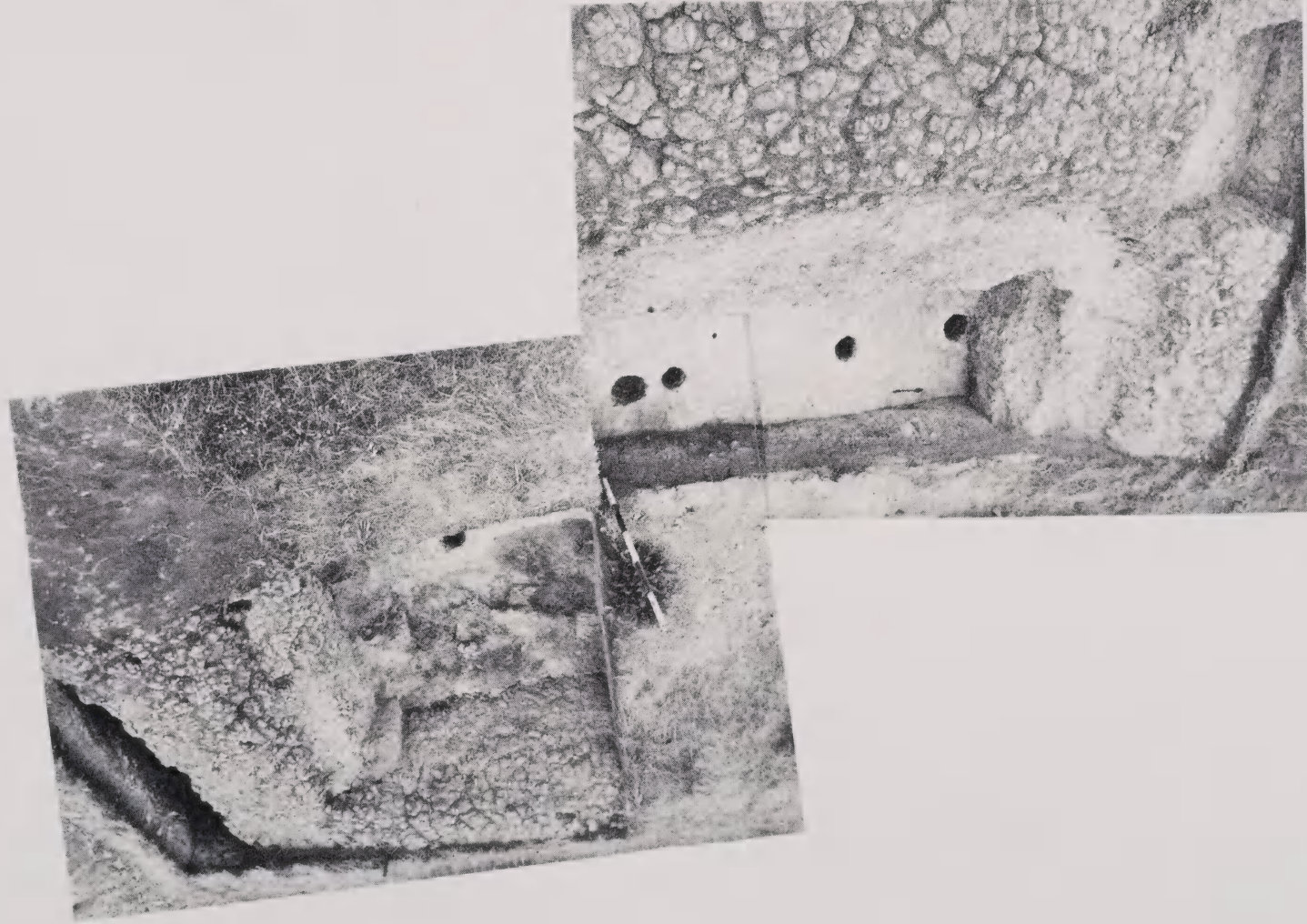


Fig. 5. N38/25B. Composite view from north of quadrates C4 (on left) to B1 (upper right) showing excavated areas. Left, pit E; centre, pit B, with ledge and baulk on right; top right, structure W. Charcoal layer 10 removed in quadrates C3 and C4 from floor of pit B, but still covering floor in quadrate B2.

to almost the last deposit before the formation of the modern topsoil. If ash was still being wind carried over some distance during the short period when pit B was in use, it was probably still in movement for a time afterwards and it is surprising that there is no thicker and more extensive layer of ash in the fill of pit B which would be a natural collecting point. It seems probable, therefore, that ash deposition in W had ceased an unknown length of time before the construction of pit B.

As the west wall of pit B is parallel with the east wall of W, and less than 2 m away from it, it seems certain that the edges of W were still perceptible when pit B was dug. W would be seen as a patch of soft ash, sloping down the side of the ridge, and marking an area which would be useless for the purpose of digging a storage pit, and therefore to be avoided. Thus, the baulk, and the west wall of pit B run parallel to this area of dead ground, but far enough away to give the pit wall adequate support and insulation. The west wall of pit B has a narrow ledge (about 50 cm wide) cut right along its lip (Fig. 5), at a level running 20 to 40 cm below the edge of the baulk. This rather unexpected feature had a structural function in the pit, but may have originated simply as a line for the west wall of pit B, marked out and dug to a shallow depth and then abandoned, because it was felt to be too close to the soft ash of W (Fig. 4), and a new line marked out a foot further back to the east.

At some time after the accumulation of ashy deposits over W, and also after the cutting of pit B, the site of W was used as a dump for material excavated or shifted somewhere in the vicinity (Fig. 6). This dump is made up of a number of different layers and lenses of material; light brown soil (layer 21); yellow clay lumps (layer 20); and several mixed layers. The top layers 21 and 20 spill down towards pit B, thin out or disappear over the top of the baulk, which appears to have been a footpath down the ridge, and reappear in pit B, fanning out from the south-west corner along the west wall. The various layers of the dump seem to represent a single unit, so it seems fairly clear that the episode of earthworking recorded by the dump does not relate to the cutting of pit B, but to an activity considerably after the abandonment of pit B.

STRATIGRAPHY OF FILL LAYERS (Fig. 6)

Layers are described from the base upwards. Layers denoted by numbers correspond to layers in pit B to which they are similar or identical.

Layer 1. Weathered and severely cracked clay natural of walls and floor, here a brownish yellow colour.

Layer a. Discontinuous patches of small pieces of white rock rubble.

Layer b. A thick deposit of a mixed character, 50-60 cm deep, containing a large number of lenses, including lenses of black powdery ash up to 5 cm thick, alternating with similar brown lenses, which appeared to be black ash, mixed with very fine particles of yellow clay, and clean thin lenses of soft yellow clay earth. This whole set of deposits had a soft floury character, and reacted like flour when a load of heavy material was dumped on top of it, by partial collapse, and by upward slippage around the edges of the heavy layers. This distortion and displacement was clearly seen in the section and indicated that the dump material on top was in fact dumped with some force.

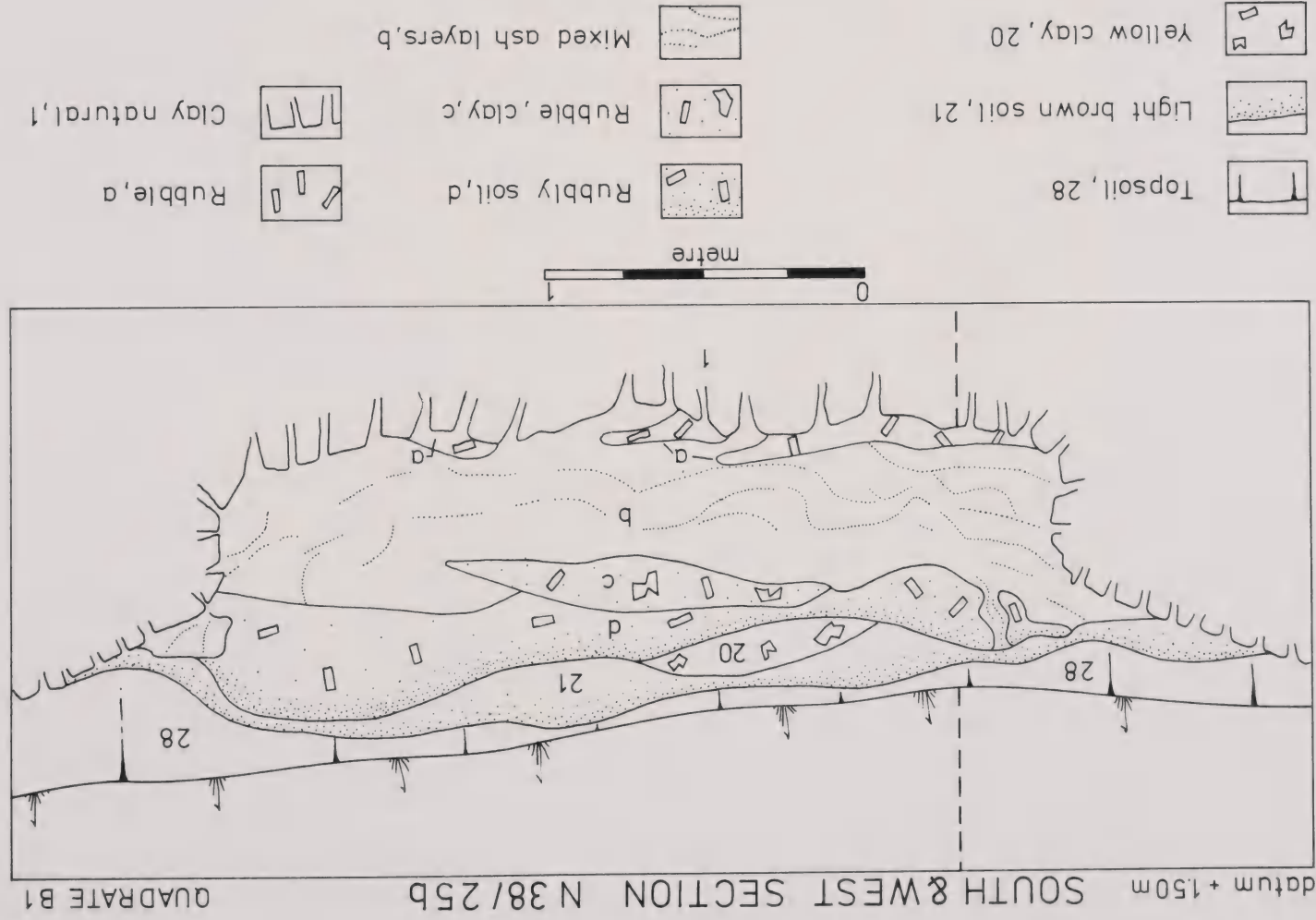


Fig. 6. N38/25B. Stratigraphy of fill layers, structure W.

Layer c. A lens of large pieces of yellowish grey rubble, with smallish to medium yellow clay lumps, and yellow clay soil. Much of this material showed caked dried rain-wash surfaces, towards the base of the layer, identical with crusts which formed on this material on the excavation spoil heap when it dried out after heavy rain.

Layer d. A thick layer of yellow clay soil, with small orange chips of rock rubble, and some clumps of hard yellow clay lumps, up to 20 cm long.

Layer 20. A lens of thick lumps of hard yellow clay averaging 15 cm in diameter. This lens petered out over the baulk and reappeared below the edge of pit B, where the identical nature of the lumps, and the relation of the layer to the overlying layer 21, make it clear that these are the same deposit.

Layer 21. A deposit of light grey brown soil, with small (0.5 cm) light grey to whitish rubble chips which gave the layer a finely angular character, though the soil had some tendency to a crumb structure and crumbled to a fine powder similar to Rangitoto ash. The continuation of layer 21 across the baulk into pit B was very thin but quite clear, and the layers were identical in both places.

Layer 28. Layer 28 was the universally present modern black topsoil which had Rangitoto ash as a basic constituent, a fine crumb structure, and apparently plentiful humic content. Layer 28 was very thin in the centre of the section over what appeared to be the peak of the dump pile, which is probably a further indication of the relative recency of this pile.

PIT B

FIRST PERIOD OF ACTIVITY

Pit B was initially cut as a flat-floored pit, taking up a large part of the available space of the width of the ridge top, leaving a narrow passage on the west, and a slightly wider area on the east. The walls of pit B were cut to about 1 m in depth in the south - west corner, with a rim at this height above floor level; walls and rim rising to about 2 m in the north and east.

The north wall and the east wall of the pit, as uncovered, were badly eroded (Fig. 5), and it is impossible to be certain what their configuration originally was; however, it is probable that they were angled back from the vertical to some extent, possibly in several slopes of different angles. It seems relatively unlikely that they were cut sheer, as there is not a sufficient volume of erosional material in the fill of the pit, to represent fully their erosion from a vertical edge to their present conformation.

On the south and west the excavated walls were in good condition, showing a clean, quite smooth clay surface, which sloped very slightly outwards from the base of the pit.

The floor of the pit, as initially cut, appeared almost flat, with a very slight slope from north and south into the centre.

There was no sign of any kind of drain cut into the floor of pit B, and although, because of later disturbances to part of this flat floor, it is impossible

to say with certainty that no drains existed, it is very likely that there were no regular drains, as there were almost certainly none just a little later.

Parts of three equally spaced rows of postholes were excavated. (Fig. 3), an approximately central row running west to east, and two side rows, each about 1 m away from the central row. Two small postholes, (g and h, Fig. 3), were excavated against the west wall, and a large one, (a), against the east wall, but there was no trace of a line of postholes against either the south or north walls.

Postholes in the left hand row in Fig. 3 had depths of 25 cm (a), 45 cm (b); 28 cm (c); and 30 cm (d). Posthole h was 45 cm deep. Postholes e, f and g were not fully excavated.

In the three rows on the floor of pit B, postholes were in line, both lengthways and crossways, but two small holes set in the top of the ledge against the side of the bank in quadrates B1 (i and j, in Fig. 3, with depths respectively of 10 and 5 cm) are out of alignment with these rows.

A small posthole, c, and a large one, d, close together in quadrate C3, show that roof supports were replaced at least once; this indication of repair and re-use of the pit after one season is borne out by other evidence. The small posthole, c, was the original one, with a fill which included small yellow clay lumps, very small pieces of charcoal, and small pieces of burnt clay. The larger replacement posthole, d, had a soft brown earthy fill, which consisted partly of decomposed woody material, apparently the rotted remains of a post butt, and postholes a, b and h had a similar decomposed woody fill to that of d. Posthole g contained a brown woody fill also. The top 20 cm of postholes e and f contained a burnt red earth fill. Below this, the fill appeared in both to be the same brown earthy and woody fill as in most of the other postholes.

As previously mentioned it is probable that no drains were cut in the floor when the pit was first constructed. This suggests that other arrangements were made for storm water drainage. One possibility is that the roof was maintained in a strongly watertight condition during the periods when it was in use.

The very large posthole e, in the central row, suggests the existence of several others of the same size in the unexcavated quadrates B3 and B4, and implies the use of a sturdy central ridge pole, probably made in several sections. This would indicate an eaved roof, with additional support provided for subsidiary battens and rafters by the two flanking rows of posts.

It is probable, in the exposed windy conditions of the ridge top, that a roof which was low in relation to the overall height of the surrounding ground would have several advantages; in lessening wind resistance by the structure, and decreasing the amount of maintenance necessary for the roof; in improving the insulating qualities of the structure, and in making the roof easily accessible from the ground for necessary repairs.

The three post rows in the centre of this pit appear to have been designed as the main structural elements of the roof. This is suggested by the apparent absence of any remains of structural supports round the sides and rim of the pit in the

south - west corner which appears to be in very good condition. There were likewise no post or slot holes on the high north side and probably on the east side. Though there has been erosion on these faces, it is likely that it was confined to a zone less than 30 cm wide, and the absence of post or stake holes here may be tentatively taken as original.

With three central rows of supports and no signs of any others, it is possible that the raftered ends of the roof rested on or close to the ground on the north and south sides, with low gable ends on east and west. The two anomalous shallow holes in the ledge may be the remains of a light gable end framework, though j is probably, and i may be, an accidental feature. (They were both filled with layer 21 material.)

To keep the pit dry it would be necessary to ensure that rain water did not pour in, especially from the north, and the most economical roof in all the circumstances would have been a pitched roof with a height of about 3 m or less from the pit floor and an unequal pitch on its two halves - i.e. a very gentle slope from the roof ridge to the upper ground surface above the north wall; with the ridge perhaps 30 cm above this surface, and the roof resting on the ground a little beyond the wall. In this case the row of posts on the north side would have to be almost as long as the central posts and it is significant that it is a post in this row which shows signs of replacement.

On the south side of the roof, there would be a more sharply angled pitch on to the lower ground at the south end, but the entire roof would not protrude more than half a metre above the general slope of the ridge, and would offer negligible resistance to the wind.

It seems likely from the arrangement of posts in the floor, that the main function of the pit was storage. It could have been used for sleeping, but was not conveniently arranged for this. Also it shows no signs of the repeated foot traffic in and out which would be expected from a shelter in daily use, whereas a store would be expected to show less sign of wear.

The natural entry point to the pit is at the south - west corner, and the height of the walls makes it improbable that there is any other entrance in the unexcavated parts of the pit. The south - west corner is the lowest point on the rim and there are several indications that it was used as an access way. Firstly, the surface of the pit rim at this point is slightly but definitely flattened over about a metre; then the existence of the ledge along the west edge of the pit provides a threshold, and the surface of the ledge has been compacted in the south - west corner.

Entry down into the pit from the ledge would have been by ladder. When the small pillar baulk shown in Fig. 5 just below the ledge in the south - west corner of the pit was removed, there was a slot in the corner of the wall, an indentation in the clay about 30 cm below the surface of the ledge, which was 20 cm long and 8 cm deep, and could have provided support for a wooden ladder of the solid timber variety. Also when the floor pits began to be dug, the area of flat floor directly in line with this, at the point where a ladder would touch the floor, was left intact (Fig. 7).



Fig. 7. N38/25B. Quadrante E2 from the west, with small pits cut into floor of pit B between postholes e (left) and f (right). Pit H (left), pit G (foreground), pit F (background). Shallow divisions between pits H/G (left centre), and G/F (centre).

SECOND PERIOD OF ACTIVITY: FLOOR PITS

It is not certain how long the original unmodified flat-floored pit was in use, though as remaining parts of this floor show little or no build up of deposits from this period, it was probably for a short time, perhaps not more than one season.

After this period, and while the roof was still in position and in good repair (the replaced post probably dates from this period), a number of small, roughly oval pits were dug into the flat floor between the roof supports; with great care taken not to weaken the roof posts to the point of collapse. These pits, F, G, and H, (Figs. 3 and 7), were excavated only in quadrante B2, but extend into quadrantes C2 and B3 at least (Fig. 3).

The sides of each pit were vertical, being cut into the weathered green coloured rock natural of pit B. The edges, though rough, were clean, and though fill in each pit was packed tight, the edges were clearly marked by a rusty brown stain from groundwater which had trickled down between the edge of the pit and the edge of the fill.

Pit G is a semi-ovoid with its large end skirting two postholes of the central row; its small end edging in between, and a little beyond, the two corresponding postholes of the south row, and coming quite close to the south wall of pit B; and its west side bellying out to scrape the west wall of pit B. Pit F shows what is obviously part of the same standard plan, with a narrow neck inching up to postholes e, and f, swelling out in the space between post rows, and showing signs of terminating at the top in the area of quadrante B3. Pit F is set at right angles to

pit G, as is also pit H, which shows conformity to the same basic egg-shaped plan, with a narrowish neck, bulbous side, and wider base.

Pit G is about 1 m wide and 1.5 m long, and this seems to be a roughly standard dimension, as pit H is about this length, and pit F about this width. Pit F, which is set largely in an unrestricted area between postholes, could have been a lot wider than 1 m, had it been desired.

Each pit was the same depth, about 60 cm at the deepest part of a gently and shallowly rounded base, which sloped down about 10 cm into these central hollows. As uncovered by excavation, with the removal of fill from each, these pits opened into one another, and it is probable that after the initial pit was dug, one pit was dug from the unfilled hollow of another. Shallow lips or divisions (Figs. 4 and 7), about 10 cm high, separated pit F from pit G and pit G from pit H, and in each case these completed the shallow saucer shape of the pit floor.

It is clear, from the care taken to dig around postholes, that the roof was still in commission at this time, and it is also clear from this that no more than one of pits F, G, or H can have been open on the surface of the floor of pit B at any one time. With only one pit open, no more than one quarter of the circumference of any one posthole would have been exposed without support at a time, and this apparently did not weaken any individual post beyond usefulness. The large posthole, e, in the central row in quadrat B2 has been exposed on three sides by successive pits, apart from a very narrow rim, and the only solid material left in position around it is a long thin neck on the east. Any post in this hole would have collapsed in the next wind if F, G and H were all open together.

The question of the order of digging of particular pits proved rather complex, and only tentative conclusions are offered. The fill in each pit clearly formed a separate unit, but each unit had wobbly but overall straight boundaries, so that it proved impossible to say that one lot of fill intercut another. However the bases appear to show some signs of intercutting, the base area of pit G seeming to be slightly encroached on by the bases of both pit F and pit H, over the lip areas. This apparent slight crowding of pit G possibly indicates that G was dug before either F or H.

In the base of pits F and G, there is a thin layer, (layer 2a, Fig. 8); this is 1.5 cm thick in G and 0.8 cm thick in F. It appears to consist of material trodden into the floors by bare feet or sandals, after being picked up outside pit B, around the area of N38/25B and tracked in. It consists of quite a lot of Rangitoto ash, of a purple-brown colour suggesting surface weathering, and frequent small particles of charcoal and fire-reddened material, all appearing to have been trodden into a sort of paste.

It is suggested that this material may have been incorporated when each pit was being dug, by people filling containers with the spoil which was being dug from a pit, taking it outside the large pit to dump, and returning for another load. As only F and G contain this layer, which is thicker in G than in F, it is possible that this indicates that the ground surface outside pit B was covered with debris from fires when G was being dug, and that such debris was still lying about in a more scattered state when F was dug, and had possibly been dispersed completely when H was made. Thus it is tentatively suggested that G may have been dug first, followed by F and then by H.

If one assumes in the apparent absence of contradictory evidence, that pit B was a store pit, and that the crop was probably sweet potato, as being the most likely item to require such a large area of insulated storage, then it seems permissible to suppose that pits F, G and H represent repositories for seed kumara.

It seems clear that these pits did not function as sumps for drainage purposes. There were no signs that water had lain in the open base of any one. The thin layer of base fill in F and G was mashed, not graded, and was spread evenly over the curving pit floor, and not as a flat-topped deposit of varying thickness, as would be expected of a water laid layer in the very restricted area of a puddle. The pits then were dry when each was open, which again presupposes an effective roof.

In the case of pit G, it might be argued that the choice of a corner directly below the entrance way as a site for a seed store seems rather a poor one. But this may have been dictated at first by its very closeness to the entrance, through a desire not to encroach on the floor area too much. Also, if the entrance was, as seems likely, a narrow gap between a low pitched roof and the ground, and if this entrance was well blocked when the pit was in use for storage, and visits to it relatively infrequent, then this was probably no real disadvantage.

It is suggested that the curved and depressed central area of the base of each floor pit was designed to support a framework of strong light branches, such as kanuka, *Leptospermum ericoides* (saplings of which are growing at present at the heads of the Station Bay stream valleys on the west of the ridge) on which kits of seed kumara might rest. The curved space under this rack would allow adequate ventilation and prevent the growth of moulds; and the floor pits could have been roofed over with a quantity of tree fern fronds.

Such a depth below the surface of the ground apparently provided good storage conditions as at least two pits similar to the first were dug, though bacterial infection probably forced their abandonment in the end.

Each pit was filled with a different kind of fill, and each lot of fill was probably levelled off flush with the floor of pit B. Pit G, apart from the thin basal layer, was filled entirely with yellow lumps of clay packed hard. Pit F and pit H each contain several layers of fill, one of which in each case appears to be freshly cut greenish rock, similar to the rock in which all three pits are cut; suggesting that in these cases an old pit was partly filled with material which had just been cut from a new pit, and that therefore there is possibly a fourth floor pit in one of the unexcavated quadrates, perhaps in B3.

It is certain that these floor pits were dug and used consecutively and not simultaneously, and it also seems clear from the close replication in pattern seen from one pit to another, and from the fact that they are clustered together and not scattered haphazardly over the floor of pit B, that they were dug at regular, probably annual intervals, and by the same group of people. Pit B, then, was in use for a minimum of three and a possible maximum of five years.

In speculating about the effect of the existence of stored food and seed on the mobility of such a group of people, one would expect that in general, the existence of a store of food would require that its owners would reside close at hand, or close enough at hand to supervise it, until it was used up. In the case of kumara harvested and stored in autumn, this would indicate that there would be autumn

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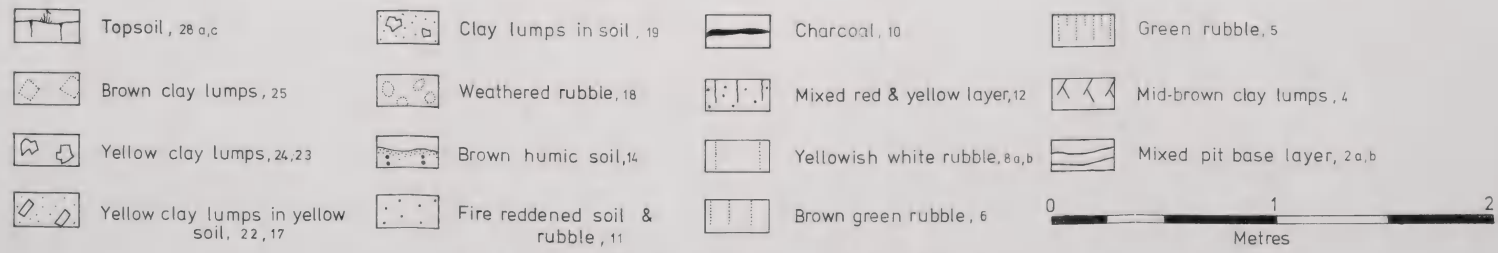
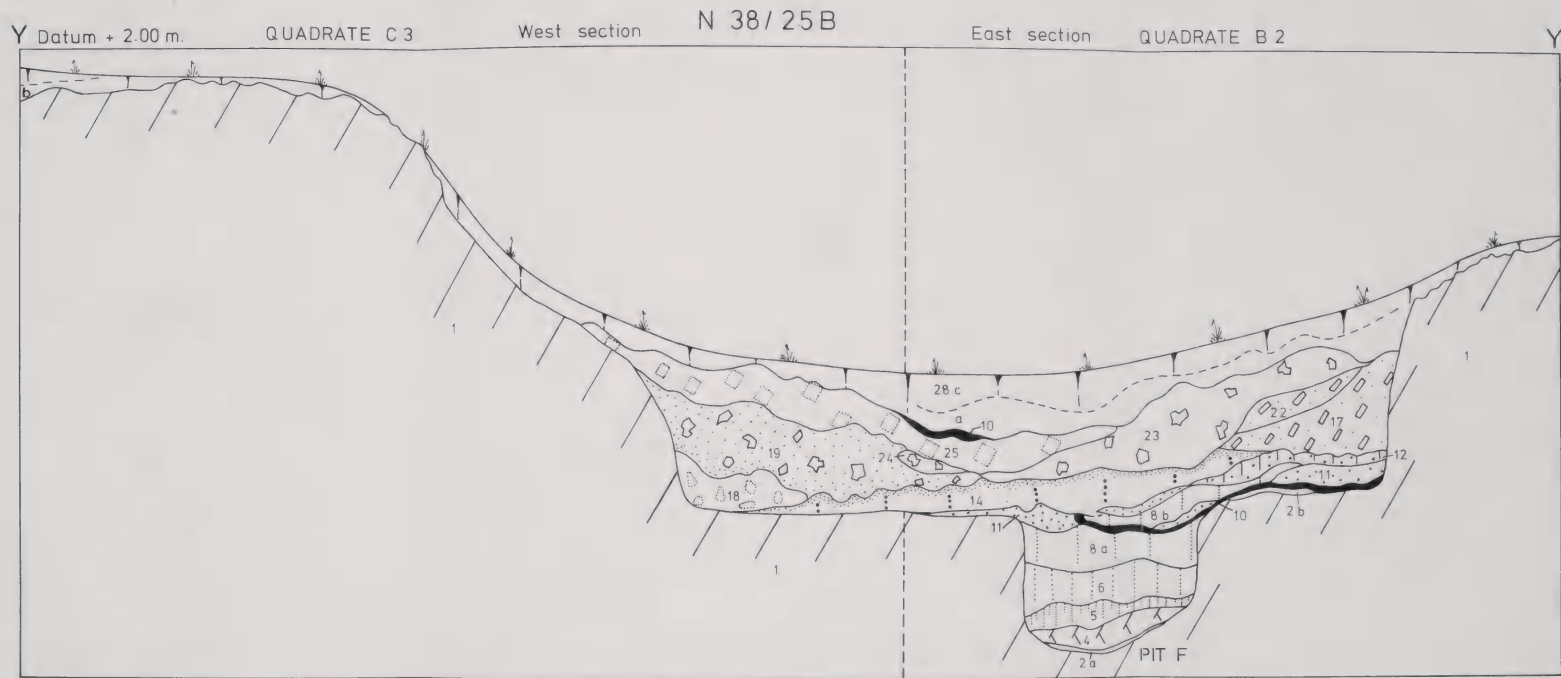


Fig. 8. N38/25B. Pit B; north-south median section of fill layers, Y-Y¹ (see inset, Fig. 9).

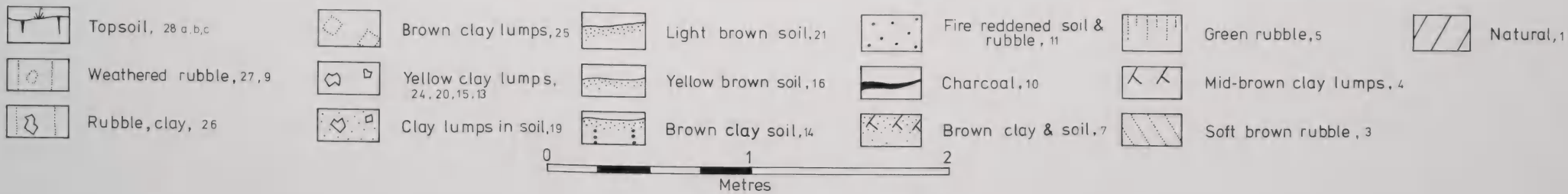
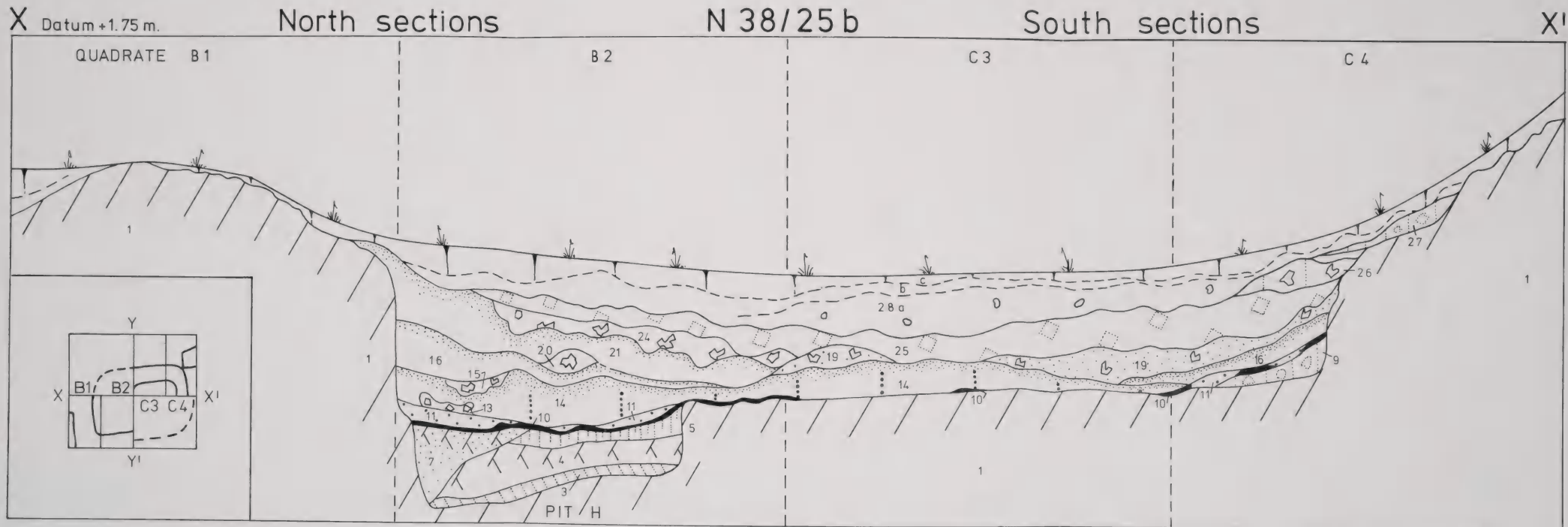


Fig. 9. N38/25B. Pit B; west-east median section of fill layers.

or winter residence, as long, at least, as the food kumara lasted. One would expect also that seed kumara would need some degree of personal supervision and occasional checking right throughout the winter, and the presumption is therefore that the owners of the pit B store would be residing in the area of Station Bay from perhaps the beginning of May until the end of August.

Thus, the floor pits in pit B appear to document the presence during the winter at Station Bay of the same group, possibly the same household for at least three consecutive winters, though giving no indication as to whether the group was there in summer or not. However it seems probable, though not conclusive, that if seed kumara were stored over winter on Motutapu they were also planted there in the spring, so that the group may have been somewhere in the neighbourhood in the spring planting season.

THIRD PERIOD OF ACTIVITY

After use of the floor pits, during the second period of activity, perhaps three years, perhaps slightly more, use of pit B was discontinued and the roof no longer maintained. Possibly part of the roof was dismantled for use elsewhere, or there may have been partial collapse over a fairly short period of time.

In any case, there was a short period of abandonment during which layer 2b, a thin layer of ash, appears to have accumulated on the floor of quadrate B2 by being blown in by wind from the area of structure W, through the apparently open west gable end. The east end was also open, and the roof in the north - east corner in a sufficient state of disrepair to allow a small amount of erosional fall-in from the high north - east corner to accumulate at the bottom on the east side of quadrate C4 (layer 9, Fig. 9).

At the time of abandonment of pit B, the three small floor pits had been filled to roughly the level of the original floor, but the sites of the filling were either known or clearly visible.

After the short time of disuse, before there had been any extensive natural deposits, and while the pit floor was largely still clean, the pit was once more utilised, this time for a short period only, perhaps not more than one day.

During this time, surviving rubbish and debris, including, clearly, from the clean condition of the floor generally, the remains of the roof, was raked up from the floor of pit B. This debris included fallen posts, and tree fern stems, and also tree fern fronds in some quantity, possibly the remains of coverings for the floor pits, and for the floor of pit B itself when used to store food kumara.

Any posts still standing appear to have been rotten, suggesting that the time of disuse had been at least several years long, and if any were still standing they seem to have been wrenched off at ground level, leaving the rotten butts in the ground.

All this debris together with a considerable quantity of additional material, mostly fronds of bracken (*Pteridium aquilinum* var. *esculentum*) wrenched up by the roots, and apparently dead and dry, but including some small forked branches, was used to kindle and keep burning for some time a large hot fire on the filled in top of pit F.

The burnt debris included a number of fragments of plaited *Cordyline* leaf, identified by Miss J. H. Goulding of the Botany Department of the Auckland Institute and Museum, who suggested that the fragments could form part of the plaited rim or handle of a basket. This seems very probable, as there are fragments of plaits of varying thickness. A thin fragment measuring 5.6 cm in length, 1.0 cm in width and 0.4 cm thick (Fig. 10), could be part of a plaited handle, and a fragment consisting of two thicker plaits each measuring 5.0 cm in length, 2.0 cm in width and 0.6 to 0.8 cm in thickness and separated by a thin crust of earth (Fig. 11) may be portions of the two sides of the rim of an empty flattened basket. These two thicknesses of plaiting are very closely paralleled by the difference in thickness on handle and rim of a *Cordyline* leaf basket in the Ethnographic Collection of the Auckland Institute and Museum (No. E.7690).

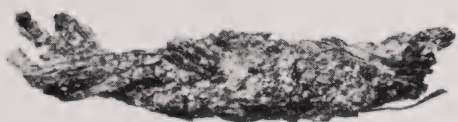
These fragments could represent abandoned storage pit debris, and in this case could tend to confirm that storage of tubers in pit B was in such kits. However it is alternatively possible that the kit belonged to one of the members of the fire-lighting party and was accidentally burnt, as by the comparison suggested above, the basket in question appears to have been the standard *kete* type of container, of rectangular shape when folded flat, which had numerous uses as a personal gear bag and an all-purpose receptacle.

The fire which was lit on the upper surface of the fill in pit B does not seem to have been lit as a cooking fire. No cooking stones and no stones of any kind were found in pit B at this level, and the only food debris located over 15 square metres at this level was a strictly localised patch, 20 cm across, beside the south wall close to the seat of the fire. This consisted of itaky, heavily calcined very fragmentary shells of a mussel species and a gastropod, and strongly gave the impression of rubbish shaken out of the upturned bottom of a bag, and then accidentally burnt in the fire.

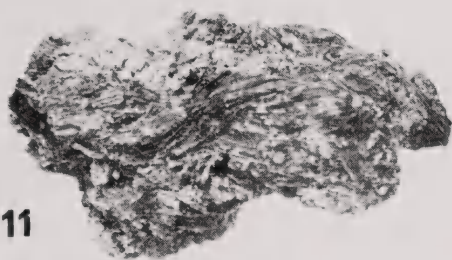
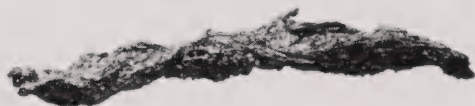
The fire was possibly lit partly for warmth and shelter by a party spending the night in the bottom of the disused pit. In any event, it burnt strongly and for some time. It was lit on top of the upper layer of fill in pit F, layer 8a (Fig. 8), a softish well-weathered layer of earth and pieces of rubble.

The effect of the heat of this strongly burning fire penetrating down into the material below, was to convert the top 15 cm of layer 8a from a yellow-white colour to strong shades of red, brown and purple. Much of this material appeared indistinguishable from soft earthy haematite. The suspected colour change was checked by heating some layer 8a material to red heat in a wood fire. When cooled it was found to be identical with material from the red layer (layer 11).

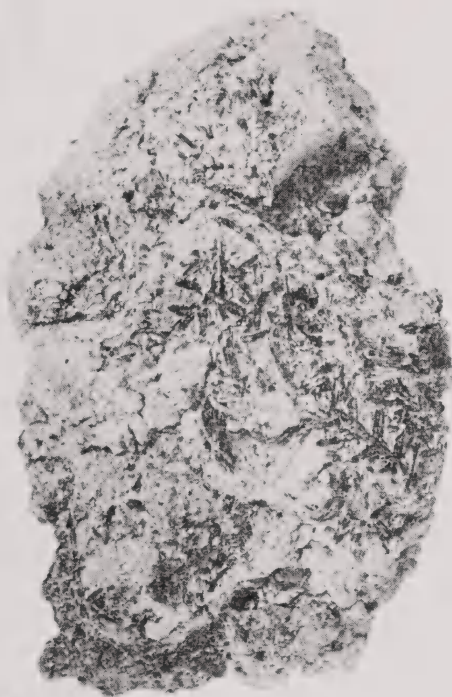
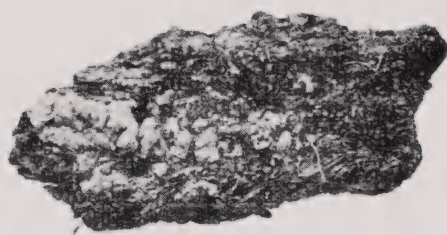
When the fire died down on the centre of the pit F fill, it was raked out. The rake-out was vigorous and thorough and scattered pieces of burnt timber and tree fern right across from one side of pit B to the other. Debris from the fire was found against the base of the north wall in big patches of up to 60 cm, and a large quantity of it was scuffed right up against the east wall on top of the fall-in layer, layer 9. This material included a lot of tree fern fragments, and some solid timber ends up to 20 cm long and 8 cm in diameter. On the other side of the fire, much closer at hand, against the west wall of pit B, was a piece of massed fibrous aerial roots of tree fern measuring 40 x 7 cm, and a carbonised forked branch of 4 cm diameter and 20 cm length, as well as numerous smaller pieces. Charcoal



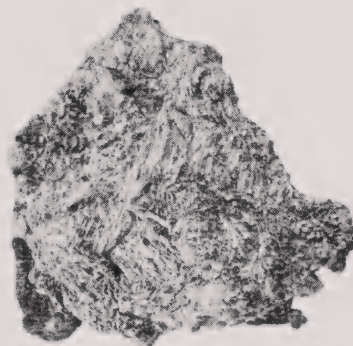
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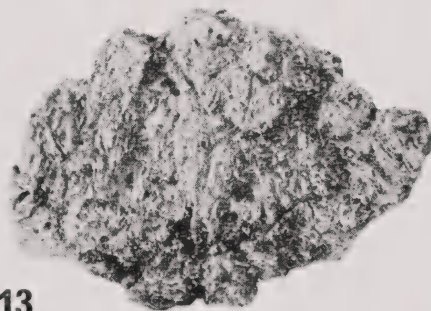
11



12



13



Figs. 10-13. N38/25B. Plant remains, pit B, all actual size. 10. Front (left) and profile (right) of fragment of plaited *Cordyline* leaf. 11. Front (left) and profile (right) of fragment with two thicknesses of coarsely plaited *Cordyline* leaf and layer of earth between. 12. Leafy fragments of fronds of bracken, *Pteridium aquilinum* var. *esculentum*, broken and superimposed. 13. Two typical examples of fragments of decomposed plaited *Phormium* leaf fibres.

round the edge of the fire was trodden underfoot in the process. Small fragments of the leafy parts of the fronds of bracken (Fig. 12) and tree fern settled in a thick shower around the perimeter of the fire, from the draught created by its burning, and were trodden into the floor, especially the Rangitoto ash strewn floor in the south-east corner of quadrangle B2, forming a crushed mass 1 to 2 cm thick which contained as many as 10 layers of carbonised fern pinnules.

In addition to the charcoal rake out, of burnt log ends etc., the reddened earth forming the fire bed in pit F, and representing the depth to which the fire's heat had penetrated into layer 8a, was also deliberately raked out. Layer 8 material occurred only in the fill of pit F (8a) and in a couple of lenses (layer 8b, Fig. 8) which lay on top of red material on the floor of pit B on the south side of pit F. This red material itself lay on top of the deposits of fine charcoal already mentioned here. The explanation of this situation is clearly that the fire-reddened material was scraped out of the top of pit F, and dumped around it on the south and west, and that the scraping continued down to the unaltered layer 8a material, some of which was also scooped out and dumped on top of the red material. The underlying layer of small fragments of bracken and fern pinnules was partly scuffed down on to the clean surface of the layer 8a material in the process. In a couple of patches in pit F, there were still traces of the unraked fire bed where pieces of burnt wood were embedded in a base of fire reddened earth about 20 x 10 cm.

Over most of the surface of the red layer, which consisted of a number of lenses, and also occurring under the red layer, and lying through thick patches of it, was a considerable quantity of fine, pale, buff-coloured to bluish, unburnt fibrous plant material. This lay in a few large patches (up to 15 by 5 cm), and a good many smaller ones, and covered most of the area of quadrangle B2 but did not occur outside it. This material (Fig. 13) was identified by Miss Goulding as the badly disintegrated remains of a fabric of *Phormium* fibres, consisting of narrow strips of leaf closely plaited, and conceivably the remains of a basket, cloak or mat. The amount and area of the material suggest a large rather than a small object and the fabric closely resembles that of a bundle of old matting collected in 1928 from Anawhata on the west coast of Auckland (Ethnology Collection, No. 23883.2).

It is most unlikely that a sleeping mat was spread out for use on the uneven surface of quadrangle B2. In this connection also it is hard to suggest why, if the fire was only lit for warmth by a party making a stop over in the large pit for temporary shelter, and isolated as it was at the bottom of a deep clay pit, it should need such vigorous raking out as to scatter large pieces of burnt fuel a distance of over 3 m, and why the fire bed should be scraped clean at the seat of the fire.

It is tentatively suggested that one possible interpretation for this set of circumstances is that fire-reddened material may have been utilised for the purpose of manufacturing red ochre, perhaps for ritual purposes, and that in pursuance of this aim the fire was raked, and the material scraped up into piles, and then dumped onto an old piece of fabric, possibly a sleeping mat, and sorted over to extract the most concentrated nuggets of ochreous material out of the more diffusely coloured earths. The piece of fabric would have been put down after the red earth had been scraped out of pit F, and most of the sorting would have taken place over the site of pit G where the red layer is thickest, and most mixed up

with scraps of the matting which was evidently so damaged in the operation that it was not worth while retrieving it later.

A characteristic of the argillite clays of the east headland is the presence of sufficient iron bearing material to redden the whole fabric of the clay when heated, and this must have been well known to the inhabitants or users of the area. Red ochre was a commonly used commodity, fragments of it being found at a large proportion of New Zealand prehistoric sites. Walsh (1904, p.5) listed among its uses the painting of ornamental parts of buildings and canoes, and noted that it was extensively used as a personal decoration. It was also (Best 1924, p. 54) used in funeral and burial practices, so that some access to a source of red ochre must be considered a social necessity even for a small or isolated community.

Haematite is met with in a number of different forms. In the red earthy variety it is relatively common as soft red deposits intercalated with non-red beds in Tertiary and Quaternary formations, on the mainland. In the north of Motutapu, most of the strata are Mesozoic and considerably indurated. No soft beds of earthy haematite would normally occur in such formations. In the softer Tertiary material in the southern part of the island, none have been seen outcropping. It seems probable therefore that there was no source of earthy haematite as such on Motutapu. But there would probably be a continuing demand for it. There is no way at present of estimating how much effort, if any, was devoted to painting buildings and canoes on Motutapu but it is probable that personal adornment claimed some attention, and that occasional deaths would create demands, possibly acute on occasions, for ceremonial red pigments.

Three burials containing a total of four individuals have been uncovered in archaeological investigations at Station Bay (Davidson 1970 b, pp. 43-44; Leahy 1970, pp. 67-68; Davidson this volume, p. 2). A small group, possibly wintering in the area, faced with a sudden need for red ochre, and having insufficient on hand, might prefer to avoid a fifteen mile canoe journey to an area like Waiwera where red earthy haematite is available, and might conceivably have utilised the chemical properties of the weathered clay of the east headland ridge to convert it by heat to red ochre.

Such a practice would probably not be general; it would be expensive in terms of fuel, would need particularly dry, fierce burning fuel, and it would be inefficient, as it would be possible to convert only a small quantity of clay to ochre on one occasion, and most of the converted material might have to be rejected as being of poor quality, leaving perhaps only a few pounds of lumps of concentrated pigment as the result of effort. But as a stop-gap practice it might have been followed occasionally.

Only a very few lumps of concentrated pigment were recovered from the material in pit B, most of the pigment being either diffused through the soil in minute particles and useless as colouring matter, or else occurring only in tiny chips averaging about 0.5 cm in diameter. This might tend to strengthen the possibility that the material had been picked over.

RESIDUAL ACTIVITY

After the episode of fire making, the ochreous material and the fragments of plaited fibre were left lying on the bottom of pit B exposed to the weather. The

surface of the layer collected a large puddle of muddy water, and many fragments of the fibres of the now almost totally rotted and disintegrated fabric sank to the bottom of the puddle to be incorporated in small thick wedges of mud and tiny red rubble chips, which were now filling up the hollows in the surface of layer 11.

Later, a thick layer of brown clay soil was deposited over the whole surface of the pit (Figs. 8 and 9, layer 14), and probably carried some type of vegetation cover. Cultural layers in the fill of the pit after this mainly record the peripheral effects of activities elsewhere. Layers such as 17 and 23 in quadrat B2 appear to be the result of dumping from the south, recording earthworking in the area, and form part of a series of deposits of restricted extent which appear in pit B from the west and south. The next layer to cover a large part of the whole area is layer 25, a layer of hard mud coloured lumps of clay set in a thin muddy sediment, which may record an episode of prolonged torrential rain eroding cracked clay surfaces up the ridge.

This layer left a rough cobbled surface of muddy lumps spread over pit B, and on it, just before the modern black soil horizon began to form, a transient party kindled a cooking fire in the central hollow at the north end of quadrat B2. The pit had by this time received a substantial amount of fill, both natural and artificial, but there was still enough of a dip left in the central hollow to provide worthwhile shelter for a cooking fire on the exposed windy ridge top. This group of passers-by ate a meal of rats, fish and shellfish from an oven containing cooking stones heated over a fire fed largely by small twigs and grassy plants.

During the first part of the period during which the modern topsoil was forming, there were further up the ridge either still occupied sites, or else older exposed sites, from which a layer of cooking stones worked its way down into pit B, at the base of the second layer of topsoil.

In this layer, in quadrat C3, there were also two thin grey argillite flakes, apparently struck off an adze blank and carried downhill in the soil with the cooking stones.

STRATIGRAPHY OF FILL LAYERS (Figs. 8 and 9)

A characteristic of the stratigraphy in pit B was the discontinuous nature of deposits, which only occasionally covered substantial areas of the whole pit. Typically, layers originated at specific areas of the pit rim, spread down the pit side some way and interfingered either laterally or frontally with similar layers.

Layer 1. Clay natural. This was the outermost, most weathered skin of the weathered outer zone of the argillite substrate. It appeared to be divided into three beds in the site area. From the east, these have weathered as follows: a, pale yellow clay; b, pale grey-white clay with rust streaks; c, brown-yellow clay. The sequence of colours of moderately unweathered rock was not established, but b at 1.3 m had deepened from pale grey to a sea-green colour, and one of the yellow clays was possibly blue at this depth, as a few chips of bluish rubble were found. The clay natural was very eroded and angular and shattered easily on the north wall, but was soft and wet with unimpeded present day drainage of rain water into the pit, at the level of the original floor, when first excavated, suggesting once more that a good roof was needed.

Layer 2. Mixed pit base layers 2a and 2b. 2a is 0.8 cm or less in pit F and up to 1.5 cm in pit G. It was a cultural composite of red rubble and charcoal in tiny fragments in Rangitoto ash. It is of interest as showing the possible use of fire to redden clay (either intentionally or unintentionally) before the episode of burning in pit B. Alternatively this may have been just the normal fine flecks of red ochre to be expected about a living site. The constituent of Rangitoto ash in 2a was continued in 2b, which is the pit base layer of pit B. This was a lens of up to 2 cm in thickness of what was apparently unmixed ash at first. Flecks of charcoal and ochre in this were the result of the fire. 2b was the first of the discontinuous lenses in pit B, and was a disuse layer, whereas 2a is a use layer.

Layer 3. Soft brown rubble; base layer of fill in pit H. This material was partly soft clay-derived earth and partly angular but soft rubble fragments. The whole layer was a brownish yellow, compact but easily removed and crumbling on removal, unlike the layer above.

Layer 4. Mid-brown clay lumps, of similar colour to layer 3, but consisting of thick lumps of clay, about 10 cm in diameter; these lumps when broken open showed a brown yellow colour without much trace of the streaking characteristic of the clay natural of pit B. The colour was similar to that of the natural in structure W, suggesting that it had a source on the west of the ridge. Water seepage through the floor pits was heavy, and they were obviously acting as drains at the present day. Clay lumps were moist, plastic and deformed by pressure, and though tightly wedged were coated with a rusty mineral, probably limonite, over the surfaces of each individual lump. Layer 4 occurred in all three pits; in H as the second layer, in F as the layer immediately above the thin trodden-in layer 2a, and in G it constituted the entire fill of the pit.

Layer 5. Green rubble. Layer 5 seems to have consisted originally of fragments of greenish rock, freshly dug from a depth where the natural kept this colour. The immediate source of green rock rubble was the rock natural at depth in pit B, and the conclusion is that where green rubble was found (in pit H as the top layer of fill, and in pit F as the second deliberate fill layer), it was being dug out of one pit and put back into another almost immediately. As a fill layer the material became compressed, but the original angularity was still perceptible, as well as the strong marking of rusty joint minerals, which persisted in its well weathered whitish condition.

Layer 6. Brown green rubble. A layer basically similar to layer 5, but a decidedly more brownish colour. Apparently layer 5 material which had weathered by exposure to the atmosphere for a time after being cut, and before being carted in as a fill. It is unlikely that layer 6 just represented the weathering of the upper part of layer 5, as layer 5 material was unweathered at a higher level in pit H.

Layer 7. Brown clay and soil. This appeared to be a mixed layer having clay lumps like those of layer 4 and brown soil, like that of layer 3 though with much less rock rubble. Pit H, the only place where this layer was found, was filled from the east end with loads from three sources, layers 3, 4 and 5, which left a sloping pile almost filling the pit at this end, while the west end was almost empty. The gap at the west end was possibly filled by scraping up the remains of dump piles of several kinds.

Layer 8. Yellowish-white material. This was a distinctive, semi-angular, much weathered material, with yellow and whitish shades about equally prominent; the yellow material carrying a mosaic of rust-coloured lines and patches. Layer 8a seems to have

been the primary layer, with layer 8b appearing to be a number of patches of material displaced from the top of layer 8a. Layer 8a was also the source of layer 11, fire reddened material. Texture and patterning of 8 and 11 were identical. The source of layer 8a was uncertain. Possibly it was a mixed layer like 7.

Layer 9. Weathered rubble. 27 and 9, with 26, represented fall-in erosion layers from back walls, and were obviously not enough to represent the collapse material of a vertical back wall; indicating that the north wall was originally angled back from vertical.

Layer 10. Charcoal. All the charcoal at the level of the floor of pit B appeared to represent the product of a single episode of burning centred in pit F from which a volume of about 0.125 m³ of charcoal was recovered; this was about 50% timber fragments, 40% tree fern remains, and 10% bracken. There was a small upper lens of charcoal on the surface of layer 25 which represents a much later fire.

Layer 11. Fire reddened soil and rubble. Consistency varied from soft rather crumbly soil to broken down angular fragments, layer 8 having a similar consistency. The most distinctive aspect was the reddish colour, ranging from a pale pinkish orange through bright orange brick shades to red browns and deep purple browns. Layer 11 material was concentrated in patches in quadrate B2, but had apparently spread a little into quadrate B3, and a thin layer had been raked out with charcoal from the fire against the east wall of pit B (Fig. 9).

In, on and under this layer was the remains of the rotted *Phormium* fabric. This had to be removed piecemeal attached to red material, but the total quantity removed would cover at least one square metre without taking account of detached puddled fibres. The surface material was localised around the edges of quadrate B2, so that apparently the fabric had been at some time spread out across the area of most of B2.

Fire reddened lenses of layer 11 had a variable depth of from 2 to 20 cm; the thick 20 cm deposit in pit G contained the embedded fabric scraps, but showed no signs of water puddling which was clearly recognisable just beside it.

Layer 12. Mixed red and yellow layer. This was made up of confused patches of layers 8 and 11, and patches where mixing of 8 and 11 was more thorough. It seemed to be the boundary layer between red and yellow, scraped out of the firebed and mixed in the process.

Layer 13. Yellow clay lumps. Layers 13, 15, 20 and 24 were very similar layers of massive hard lumps of weathered yellow clay, up to 20 cm in size. Lenses 13 and 15 were small, though containing large lumps; the texture and consistency of this "clay" appeared to be largely the result of exerted pressure, either from levering tools like digging sticks, or from the pressure of foot traffic over material close to the ground surface. Layer 13 seemed to have fallen into the pit from the western side, where the ground surface provided a natural path down the ridge along the baulk between B and W and where some rolling down of material from higher up the ridge was to be expected on a limited scale.

Layer 14. Layer 14 was more extensive than any preceding deposit on the surface of the clay natural. It was a thick layer, though overall it thinned out towards the south side of pit B, being about 30 cm deep over the surface of pit H. It had a fairly homogeneous appearance, being a distinctive khaki brown when damp, but drying out to a

faintly purplish brown. The material is probably best described as a clay soil. It had a structure of small lumps averaging about 0.5 to 1.0 cm and consisting of a stiff clay based material. It contained a proportion of small (about 2 mm) unassimilated lumps of yellow clay, and angular rock rubble fragments of an orange colour, as well as similar sized flecks of charcoal. It seemed to have had a population of soil organisms at some time. Its relatively uniform appearance and fairly even spread suggested that it was deposited in relatively stable conditions. It seemed to represent a period when at least some of the area of site N38/25B was being allowed to lie idle and form some sort of vegetation cover. The thickness of layer 14 in pit B suggested that this period of apparent freedom from human interference was a relatively long one, and that during this time the natural processes of downhill soil creep and fall-in deposited layer 14 in pit B, in much the same way that the present thick topsoil layer has been deposited in conditions of freedom from mechanical disturbance. However, too much should not be made of indications of lack of activity in the immediate area. This layer, layer 14, was the lowest layer of fill in pit E also, and the evidence from pit E tended to show that there were still people around, though not actually on the spot.

Layer 15. Yellow clay lumps. An isolated patch similar to 13, and from the same direction.

Layer 16. Yellow brown soil. Layer 16 was a yellow brown soil, distinctly lighter than layer 14, and containing more clay, some small orange lumps, and some larger yellow lumps up to 5 cm. It occurred as discontinuous lenses of apparently identical material at two ends of the pit, and seemed to be replaced in the north central part by layer 18. These layers clearly reflected a change of surface conditions, perhaps some clearing of vegetation, which set surface material on the move into the pit again, and exposed the back wall in part to erosion and fall-in.

Layer 17. Yellow clay lumps in yellow soil. This was the first of a series of rather thick discontinuous lenses or wedges of material which entered pit B over the top of its south lip. The excavated part of layer 17 was confined to the south central area of pit B, thinning out and disappearing both towards the west wall, and towards the central concavity of the pit. Layer 17 consisted of large (10-15 cm) yellow clay lumps, with pockets of yellow soil, derived from clay material. Layer 17 was clearly a layer of cultural origin, as there was no natural source of such a quantity of material on the south of the pit, where the top of the rim was 1 m or less wide, before it descended to the narrow flat area below. There had been earthworking activities here, and layer 17 marked the first record of them in the fill of pit B.

The original profile of the ridge had a low point in the area of this strip of ground below the south edge of pit B, which must then have included the area in which the defensive ditch was later dug. From the excavation of a narrow strip which ran from quadrat B2 to the north edge of the ditch (which drops sheer from the flat area) (Davidson, pers. comm.), it was seen that the south wall of pit B, where it sloped down to this flat (a vertical distance of about 1 m, so that its surface and the flat floor of pit B are about at the same level), had been cut back artificially to form a flat-surfaced scarp angled back at about 45 degrees. It is possibly some of the clay removed in this cutting back of the slope which was heaved over the top of the rim into the south side of pit B and which makes up layer 17 and layer 22. This shaping of the slope must have come after the cutting of pit B because it seems unlikely that the builders of pit B would have placed their south wall quite so close to it. This activity of wall shaping, linked with a vague hollowing out of the ground surface at the foot of it, can

possibly be assigned to an initial attempt to construct a defensive ditch a few metres north of its final position. This first attempt to dig a ditch (if it was so) may have also been linked with an intention to fill in pit B by pushing fill up over its south lip (layers 17, 22 and 23), an intention which was not carried to completion. This was probably connected with the shifting of the line of the ditch five metres further south, which would make the filling of pit B unnecessary to the construction of the ditch.

Layer 18. Weathered rubble. Layer 18, however, was slightly more mixed in character than the designation suggests. Besides rubble it had lumpy yellow brown clay soil, and may have incorporated part of layer 14.

Layer 19. Clay lumps in soil. This was another localised fill layer. It was thick and seemed to have poured over the back wall of the pit, so it possibly represented a flood torrent load over a mainly rather bare clay surface. It was a layer of pale brown to pale yellow brown clay lumps, about 5-8 cm in diameter in a packed and hard pale brown clay-derived soil. It also contained a few lumps of yellow clay which seem "clean" in relation to the rest of the material.

Layer 20. Yellow clay lumps. The end point of a fan out of material over the baulk from structure W; renewed activity here occurring long after the complete disuse of pit B. The lumps of layer 20 were 10-20 cm thick and formed a single layer blanketed and penetrated by other layers, especially layer 21.

Layer 21. Light brown soil. Identical with 21 in structure W, except for thin streaks of Rangitoto ash in layer 21 in pit B, close to the west wall. This material seemed to have a tendency to ooze out under the layer 21 material where the latter was thinned by foot traffic down the baulk path, so patches of ash appeared to indicate passers by, scuffing this material over the edge.

Layer 22. As seen in quadrat B2, layer 22, was only the thin lateral part of a wedge which fingered in between layers 17 and 21, but petered out after less than a metre. It was very similar to layer 17 and the division is possibly arbitrary. It contained more soil and fewer yellow clay lumps.

Layer 23. Yellow clay lumps. This layer, like 17 and 22, lensed out to the west, but went much further into the centre of pit B. Like 17 and 22 again, it represented earthworking in the area below pit B. It may represent the cutting back of the slope below pit B, though it might also be some of the material removed from the existing ditch, and dumped in pit B. Layer 23 consisted of massive yellow clay lumps up to 30 cm in diameter. These were close packed with little or no softer material between them, and in section showed the form of a classic dump cone, clearly indicating their source on the side of the short slope of the cone. Their passage over the rim top of pit B was clearly marked, too, by the erosion of the surface few centimetres of clay which can be seen on the south rim of pit B in Fig. 5 on the east side of quadrat B2. Lumps of this size indicate major earthworking, and considerable effort expended even to roll them up the slope into pit B. When broken open, the lumps show a homogeneous clean yellow colour in the centre, with some lumps having a band of about one centimetre round their peripheries which contained inclusions in the form of minute flecks of disintegrated charcoal. In an area such as Station Bay and its east ridge, occupied over prolonged periods, such charcoal is an indication of the lack of any occupation in the immediate vicinity at the time of deposition of the layer containing it, but also an indication of the possibility of settlement either not too far away or not too long ago.

Such comminuted charcoal was observed in layer 14, and also in slightly different company in layer 2a.

Layer 24. Yellow clay lumps. Layer 24 was basically similar to layer 20, being a single gappy layer of clay lumps. However, 24 clearly came down from the north or northwest, and seemed to indicate activity in that area also. Its bulk lay in the unexcavated quadrat C2.

Layer 25. Brown clay lumps. Like layer 14, layer 25 was a quite extensive layer, apparently indicating the termination of much of the previous activity. It was a layer of possible cultural origin, but naturally deposited from a flood torrent. It consisted of 8-10 cm lumps of brown muddy looking clay, showing some faint yellow central patches, the whole packed extremely hard, and set in a thin hard mud layer of the same muddy colour. It was clearly a flood pile, but the material gathered up by the waters on their way down the ridge could quite well be spoil from recent earthworks. Layer 25 formed an extensive sheet in pit B and reached further towards the slope of the south wall of pit B than shown by the point it reached in the line of section; coming in fact within a metre of the south wall. It was on the not very comfortable surface of this deposit that a late cooking fire was lit and an amount of food waste scattered just before topsoil began to form. This midden material, belonging to the top of layer 25, was actually collected right through the depth of the layer where it had fallen through gaps as far as the surface of layers 21 and 14, owing to the lensing and discontinuous nature of the layers, and the gaps provided by the various clay lump layers. It was restricted to the north end of B2 with a slight extension into the south of C3.

The midden material was heavily eroded and fragmentary, as well as being of limited amount. Among the shells there were a few periwinkles, *Lunella smaragda*; sizes of opercula along long axis, followed by number of individuals, were as follows: 0.4 cm (1), 0.5 cm (1), 0.6 cm (2), 0.8 cm (4), 1.1 cm (2), 1.3 cm (2), 1.4 cm (1), a minimum of 13 individuals. Eroded fragments of other gastropods amounted to about the same number. The presence of the only cockle (*Chione stuchburyi*) appeared to be accidental, as the valve measured 0.9 cm across. The other shells all seemed to be rocky shore species which would probably be available close to or in Station Bay.

Most of the midden material was fish bone, including left jaw fragments of a minimum of five small fish. Four of these fish were snapper (*Chrysophrys auratus*). The bones were mostly head bones, with a number of vertebral spines.

Rat bones included jaws of three different individuals.

The fire which cooked this meal was located right at the bottom of the hollow of the pit as it then existed, in quadrat B2. The charcoal and stones accompanying it were recovered largely from the base of layer 28 which covered it over. The site of the fire was marked by a localised black staining of layer 28, and by a rather small amount of charcoal. The material of this fire was scattered over the shallow surface of the pit, and remains gathered around the site of the fire consisted of a few grams of short thin stalks about 2 mm in diameter, though it is possible that material in quadrat B2 (consisting of about a dozen pieces of blocky charcoal ranging from 2 to 5 cm and collected on the surface of layer 14 where it had apparently fallen through gaps) represented the remains of more solid timber used in this fire.

Layer 26. Rubble clay. This was a restricted patch of material in the north-east

corner of the east wall of pit B. It contained angular rubble fall-off from the east wall of the pit immediately behind it, which had been mixed with a number of small (about 5 cm diameter) lumps of yellow clay, possibly from the flat ground at the top of the wall.

Layer 27. Weathered rubble. This deposit of whitish weathered angular rubble pieces, was possibly more or less *in situ* material eroded off the north-east corner but not fallen very far from its original situation.

Layer 28. Topsoil. This layer, present over the whole ridge top, was about 50 cm deep in the centre of pit B. It was dark coloured, black looking when damp, drying out to an ashy grey. The material had a crumb structure and individual particles broke down to material indistinguishable from weathered Rangitoto ash, when crushed. In this thick layer there were several marker horizons, discernible in the deeper deposits, but not seen in places where the layer thinned out over the baulk, and on the north and south rims of the pit. On the north it thinned to vanishing point, and when the grass was removed initially the upper ground surface was found to be composed of clay lumps in several places, but it began to thicken again in a pronounced way in the middle of the area dividing pit B from pit C, which possibly indicates some sub-surface structure on the edge of pit C. Topsoil zone a, the lowest zone, had a basal layer of minute angular white rock rubble chips, with a few orange pieces. This base layer appeared only in the central hollow of pit B, and was probably collected by the very light scraping which the topsoil would give the north wall of the pit as it progressed down it, the obvious direction of emplacement of the topsoil being from the north and from higher ground generally.

A lot of the midden material from the last fire was recovered from the bottom few centimetres of the base of layer 28, as were most of the stones of the cooking oven, and all of these are, of course, to be related in the sequence to the interface between 25 and 28. The localised black staining and thin charcoal remains of the fire were also as previously mentioned, mingled with this base layer of 28.

In the north-east corner of B2 against the east wall of the quadrat, there was a thick scatter of large fragments of hard, only slightly weathered, argillite rock, which was a dark grey on freshly broken faces. The largest fragment was 12 x 8 cm. This was jointed, though some joints were quite widely spaced. Surfaces were angular fracture surfaces, though some of the material showed pebble surfaces. A few showed signs of heating.

Zone b of the topsoil contained no small rubble chips, but in quadrates C3 and C4 it appeared to contain a surface marked by a rather uniform scatter of stones smaller than some of those previously encountered but otherwise very similar. These were probably too high in the layer to be associated with the fire on the surface of layer 25. The stone scatter was very marked at the top of pit B, in the flat area in C3 and C4, and seemed to have worked its way downhill in normal soil movement from some area of concentration higher up slope. All the stone appeared to be the same fractured dark grey argillite except for a 5 cm pebble of black vesicular lava from B2. This was lensoidally flattened, and there was also a larger pebble (12 x 8 x 4 cm) of a greenish gritty conglomerate, possibly from a beach on the south or west of the island, which had had four rough flakes knocked off one end, in two directions, and could have been a rough chopper or pounder. Two flakes of dark grey argillite of a material apparently identical to that of the ubiquitous lumps were possibly flakes struck on a

large cobble to prepare an adze blank. One was subtriangular in shape, with a narrow curving waterworn surface on one rim, and was 3.8 x 3.5 x 0.4 cm. The other larger flake measured 5 x 5 x 0.3 cm and was roughly rectangular with one large pebble surface. This flake was almost razor thin along one edge, and this edge showed signs of use. Both of these flakes were found in the line of section on the east wall of C3, just west of C4, at a depth of 25 cm in the topsoil. A third struck flake of identical material, but only 1.3 x 0.8 cm, was found at 35 cm in the same layer in B2.

Total weight of all stone in layer 28 in B1 to C4 was 37.87 kg, distributed as shown in Table 1. Most of the stone from B2 related to the late fire, as did a little of that from C3.

Table 1. Distribution and weight of stone fragments.

SURFACE OF FRAGMENT	EXCAVATED AREA			
	B1 (kg)	B2 (kg)	C3, C4, inside pit B (kg)	C3, C4, outside pit B (kg)
Fractured	1.8	8.2	9.1	3.2
Fractured, with pebble surface	0.45	2.7	3.2	0.9
Pebble	0.45	2.7	1.8	0.9
Total	2.7	13.6	14.1	5.0

The depth of black soil in pit B in the centre was about twice the average depth of topsoil outside it, and it is clear that the pit had been acting as a trap for soil moving down slope during a period of minimal interference to the ground surface. One can perhaps tentatively equate this time with the duration of pastoral farming on the island.

PIT E

This was a small straight-sided pit, narrow and flat-bottomed, the south-west corner of which almost touched the north-east corner of pit B. There is a 20 cm gap between them at present. This would have been probably at least double the width before erosion of the north wall of pit B. Pit E (Figs. 14, 15) was cut with sides parallel to those of pit B and structure W. It was set on the edge of the flat area between pit B and the next pit up the ridge, pit C. This area was about 4 m wide, but in the excavated area in quadrates C3 and C4 it was completely featureless, having only the previously mentioned scatter of cooking stones on top of an undisturbed clay natural layer close to the present ground surface.

Pit E extended out in the direction of the edge of the ridge which overlooks the sea. The excavated section was 1 m wide all round. Before excavation, the only indication of its existence was a slight wobble in the north rim of pit B (Fig. 4), at the north-east corner where the walls of each pit meet at a corner and are both rather worn down. At the edge of the excavated area on the east edge of quadrate C4, the rim of pit E was 25 cm below present ground surface, and the highest or north wall is 75 cm deep. On the south the wall ran from 60 to about 30 cm at the tangent corner, and the west wall sloped down from 70 to about 30 cm at the same corner. Pit E was 1 m long in the excavated section, and it is perhaps unlikely that it was more than about 2 m in overall length because of the seaward slope of the ridge here.

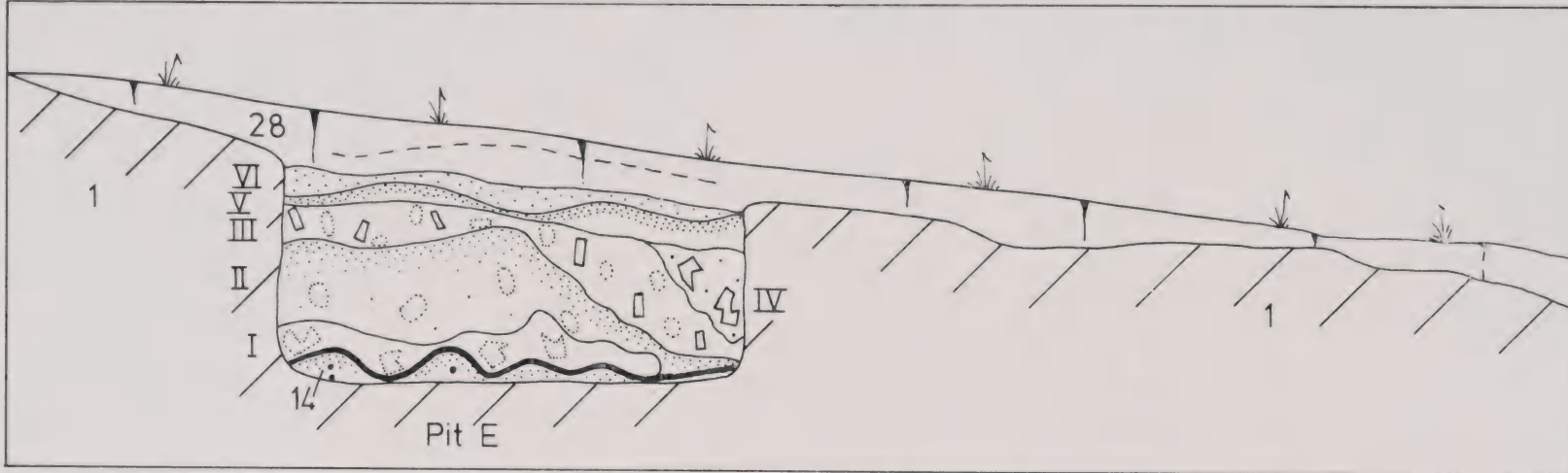


Fig. 14. N38/25B. Pit E, from east, showing small buttress against west wall.

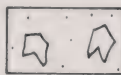
Pit E was much higher up than pit B, and touched only its upper rim, but the two structures appeared obviously connected. There was a very small low buttress in pit E (Fig. 14) placed against the wall at right angles to the north rim of pit B. The obvious inference is that pit B was in existence when pit E was cut, and this is borne out by some similarity of fill layers. Pit E was noteworthy for the cleanness of its sides and the fairly good condition of its edges. This suggests that it did not stand open for any length of time and that it was filled soon after it was cut.

Although it is of very different shape and style, its apparent size (1.5 m long?) suggests comparison with the floor pits in pit B. Was this also a small specialised store, not necessarily a kumara seed store, for the proprietors of pit B? It seems to have been filled not very long after it was cut. The bottom layer in it was a powdering of charcoal and red ochre fragments, which seems to be a tracked-in dirt layer, suggesting that this pit was cut soon after the large fire which reddened the earth in pit B. The next layer of material on the floor of pit E was a natural one, and was identical with layer 14 in the fill of pit B. However in pit E this layer was much thinner than in pit B and its outline was distorted by layers of fill dumped on top of it. Obviously, pit E was dug beside pit B soon after the big fire. It was used for a season perhaps, and then left open and empty, and layer 14 material began to accumulate in it, probably under a vegetation cover (possibly bracken). Before the end of the period of accumulation of this material in pit B however, (perhaps one third to one half of the way through, on a comparison of the thickness of layer 14 in the two areas) pit E was filled in, and the fill carefully levelled to the slope of the ground surface (Fig. 15).

This fill was clearly artificial, the layers showing clear dump profiles, and the reason for filling pit E in an area which appears to have been overgrown,



Topsoil 28



Yellow clay IV



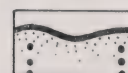
White clay lumps I



Light soil rubble VI



Soil, clay, rubble III



Brown soil 14



Mixed soil V



Mixed yellow layer
II



Natural 1

Fig. 15. N38/25B. Pit E, section of fill layers.

and which was left in that state after pit E was filled, seems to have been to remove a rather nasty little obstacle from the path down the east side of the ridge past the east end of pit B. This suggests continuance of activity in the area, probably on the pa, with frequent passage up and down the ridge via the eastern side of pit B, which is the natural side to pass when making for the north-east.

STRATIGRAPHY OF FILL LAYERS (Fig. 15)

Layer I. Natural. Weathered pale yellow clay of pit sides and base. Slightly cracked on floor, clean on sides.

Layer 14. Brown soil. Identical with layer 14 in fill of pit B. Underlain on floor of pit E by thin streaking of charcoal fragments and red ochre chips, less than 5 cm thick; patchy. In pit E, layer 14 had been crushed and distorted by emplacement of overlying fill, and was originally perhaps one quarter of the thickness of layer 14 in pit B. It marked the fairly short period when pit E lay open and unused.

Layer I. White clay. A layer of lumps of whitish clay, 10-15 cm in diameter, with some pieces of angular whitish rubble up to 10 cm. A few small pieces of hard reddened material occur in this layer and layers II, III and IV.

Layer II. Mixed yellow layer. Yellowish, moderately soft layer of clay-derived material, with lumps of weathered rubble (5-8 cm) and flecks of yellow and whitish clay less than 1 cm.

Layer III. Soil, clay, rubble. Light yellow-brown soil, with much white clay in 1 to 5 cm lumps; a few yellow clay lumps, 1-2 cm, and some angular rubble less than 1 cm. Layers I, II and III showed in section the advancing front of a dump cone produced by layers of fill being thrown in from the north side.

Layer IV. Yellow clay. Lumps of hard yellow clay up to 10 cm, with softer yellow clay earth between.

Layer V. Mixed soil. A light brown soil layer, with small pieces of whitish clay and rubble, 2-3 cm.

Layer VI. Light soil, rubble. Similar to V, with less clay, and with pieces of whitish rubble forming a distinct base line to the layer.

Layer 28. Topsoil, b and c. Dark brown topsoil zones b (with slight stone scatter) and c (loose surface zone) as for pit B.

CONCLUSION

Excavation of four quadrates in site N38/25B gave an incomplete but detailed picture of occupation covering at least four distinct periods.

The earliest period, represented by the possible terrace, W, is rather obscure, information obtained doing little more than document artificial modification of the terrain on the ridge at a time which apparently predates the surface redistribution of the original volcanic ash blanket into smaller discontinuous patches.

The second period relates to the use of pit B, and by implication to the use of the other structures open on the present day surface, pits C and D. The sub-surface complexity of the excavated area has to be kept in mind when trying to assess the possible relationship of pit B to pits C and D. There is no apparent necessary logic of positioning here to determine order of construction, and the probability is that from their generally similar surface appearance, B, C and D were in use at much the same time. However, 'the same time' could well be a period of decades. The use of pit B is fairly reliably seen to have been for a minimum of three years, and by a single group during that time. But information about this group is fragmentary. Its storage site is known; its eating, sleeping and work areas unknown. Information about the storage unit itself is affected by the uncertainties of its unassessed relation to two apparently similar storage units. If pit B did represent the storage space of a single household, then perhaps pits C and D are storage units of two further households; household C needing less storage than the others. But there seems no valid way of distinguishing at present between this and several other possibilities, i.e. that the three pits are the clustered stores of a single large group and all in use at once, or that they represent stores built serially by a smaller group over a continuous and perhaps substantial period; and in fact, the analogous attribution of storage function to C and D may be questionable.

The third period postdates the use of pit B at least by the interval represented by the accumulation of layers 14 to 16, but there are suggestions that the gap represents a move some way off rather than complete disuse. Period three appears to cover some length of time, and to be associated with at least some part of the defensive works connected with the pa, in particular earth working preceding the construction of the northern ditch. Its characteristic is the purely peripheral nature of the use of N38/25B at this time.

Period four, late in time, marked by the casual meal eaten in pit B, seems possibly to mark the disuse of the whole ridge area as a site of occupation of any but a transitory nature.

The second period is the period of major utilisation, and this shows the distinguishing character of extensive as opposed to intensive occupation. Time, as represented by successive structures, B, G, F, H, E, is recorded very largely by lateral movement across the surface of the ground, and not by vertical stacking. The floor pits certainly cut the surface of B, but they then proceed to take successive orderly bites out of the floor space, as if the intention had been to cover the whole floor with pits in a leisurely way, if some unknown factor had not intervened, and whatever dictated the placing of pit E as a small excrescence on the north-east of pit B it was certainly not lack of space outside, or inside.

It seems reasonable to place the use of pit B, and by extension, the use of pits C and D concurrently with one of the earlier periods of occupation of the area south of the ditch.

The distinguishing aspect of the use of ground at N38/25B is its non-intensive nature, and fairly wide spacing, in general, in relation to total topography. This relates to a period of N38/25 when there was no constriction of area by a ditch, so it is possible that with a tendency to wide spacing in one part of the area at least, N38/25B overlapped with and formed part of the rest of the site.

Under these terms, then, N38/25B can be regarded as a sector preserving something of a portion of the original layout of an early period of N38/25.

The changing character of occupation on the ridge top is graphically illustrated, under this hypothesis, by the three unfilled pits B, C and D. Filling in a pit by manual methods is hard, largely unproductive work. The only product of a filled pit is a small patch of flat ground, and a corollary of this is that where pits are deliberately filled in by hand, small patches of flat ground are for one reason or another highly desirable or at a premium. On N38/25B, the floor pits in B were successively filled because the rest of the floor space was obviously in current use. Pit E seems to have been filled because it represented an obstacle in what had become a path. But occupation on the ridge never got to the point of really wanting flat ground again in the N38/25B area (although it seems to have been thought about at one stage), and consequently B, C and D were just left open; the contrast between the numerous superimposed and intercutting pits south of the ditch and the dead ground of N38/25B being a contrast between occupation which in an earlier period was at least in part extensive and undefended, and at a later time constricted, concentrated and intensive.

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